

CLAIMS

I Claim:

1 **1.** A method of generating operation codes, comprising:
2 creating a plurality of encoded code words;
3 eliminating from the plurality of encoded code words all code words that do
4 not meet a predetermined selection criteria;
5 selecting an encoded code word from the plurality of remaining encoded code
6 words;
7 determining a hamming distance between the selected encoded code word
8 and all remaining encoded code words;
9 deleting all of the remaining encoded code words that do not have a
10 hamming distance greater than a predetermined minimum with the selected encoded
11 code word, to form a set of encoded code words, wherein the predetermined
12 minimum hamming distance prevents any two encoded code words from having
13 fewer than a predetermined number of bits different.

1 **2.** The method recited in claim 1, wherein the predetermined selection
2 criteria is that each encoded code word will have an equal number of ones and
3 zeros.

1 **3.** The method recited in claim 2, wherein the operations of selecting an
2 encoded code word from the plurality of remaining encoded code words, determining
3 a hamming distance between the selected encoded code word and all remaining
4 encoded code words, and deleting all of the remaining encoding code words that do
5 not have a predetermined minimum hamming distance with the selected encoded
6 code word to form a set of encoded code words are repeated for each and every
7 encoded code word in the set of encoded code words to form a finite set of encoded
8 code words representing operation codes.

1 **4.** The method recited in claim 3, further comprising:
2 selecting an encoded code word from the finite set of encoded code words;
3 and
4 reverse mapping each encoded code word of the finite set of encoded code
5 words to form a second set of finite encoded code words in which each encoded
6 code word has been reduced in size by a predetermined number of bits.

1 **5.** The method recited in claim 4, further comprising:
2 reverse scrambling the second set finite encoded code words to form a set of
3 operation codes, wherein the set of operation codes represent functions to be
4 performed by a receiving device.

1 **6.** A method for transmitting and receiving a packet of information,
2 comprising:

3 generating a table having a plurality of associated operation codes, scrambler
4 syndrome values, scrambled values, and encoded code words, wherein the plurality
5 of encoded code words have been selected based upon predetermined criteria and
6 each code word has a maximum hamming distance between all other encoded code
7 words;

8 resetting a scrambler generator using a scrambler seed value at the beginning
9 of transmission;

10 scrambling a plurality of data value by XORing the plurality of data values with
11 a value from the scrambler syndrome generator to form a plurality of scrambled
12 values;

13 encoding the plurality of scrambled values to a plurality of encoded scrambled
14 values having a greater number of bits;

15 transmitting an encoded code word representing an operation code to a
16 receiving device;

17 decoding and descrambling the encoded code word to create a code word;

18 comparing the code word against the table having the plurality of associated
19 operation codes, scrambler syndrome values, scrambled values, and encoded code
20 words by the receiving device; and

21 acting upon the received opcode immediately after decoding to properly
22 process the rest of the incoming data.

1 **7.** The method recited in claim 6, wherein the predetermined selection
2 criteria is that each encoded code word will have any equal number of ones and
3 zeros.

1 **8.** The method recited in claim 7, wherein the minimum hamming distance
2 between the encoded code words prevents each of the encoded code words from
3 having fewer than a predetermined number of bits different from any other encoded
4 code word.

1 **9.** The method recited in claim 8, wherein the accepting of the data when
2 a match is found in the table containing all the encoded code word, further
3 comprises:

4 receiving a character by the receiving device;

5 decoding the received character to reduce the number of bits contained in the
6 receive character;

7 de-scrambling the character by XORing the character with the value received
8 from the scrambler generator;

9 determining if a first character received is a valid opcode by comparing the
10 first to a table containing opcodes;

11 transmitting a retransmission when the first character is not a valid opcode
12 and

13 repeating receiving a character by the receiving device, decoding the received
14 character to reduce the number of bits contained in the receive character, de-

15 scrambling the character by XORing the character with the value received from the
16 scrambler generator until no further characters are received when the first character
17 is a valid opcode.

1 **10.** The method recited in claim 9, wherein the predetermined selection
2 criteria is that each encoded code word will have any equal number of ones and
3 zeros.

1 **11.** The method recited in claim 10, wherein the hamming distance
2 between the plurality of encoded code words prevents any two encoded code words
3 of the plurality of encoded code words having fewer than a predetermined number
4 of bits different.

1 **12.** The method recited in claim 11, wherein the minimum hamming
2 distance is four bits.

3 **13.** A computer program embodied on a computer readable medium and
4 executable by a computer, comprising:

5 generating a table having a plurality of associated operation codes, scrambler
6 syndrome values, scrambled values, and encoded code words, wherein the plurality
7 of encoded code words have been selected based upon predetermined criteria and
8 each code word has a minimum hamming distance between all other encoded code
9 words;

10 resetting a scrambler generator using a seed value;
11 scrambling a plurality of data values by XORing the plurality of data values
12 with the plurality of data values generated by the scrambler generator to form a
13 plurality of scrambled values;
14 converting the plurality of scrambled values to a plurality of encoded
15 scrambled values having a greater number of bits;
16 transmitting an encoded code word representing an operation code to a
17 receiving device;
18 decoding and descrambling the encoded code word to create a code word;
19 comparing the code word against the table having the plurality of associated
20 operation codes, scrambler syndrome values, scrambled values, and encoded code
21 words by the receiving device; and
22 requesting a retransmission of data when a match cannot be found in the
23 table for the encoded code words.

1 **14.** The computer program recited in claim 13, wherein the predetermined
2 selection criteria is that each encoded code word will have any equal number of ones
3 and zeros.

1 **15.** The computer program recited in claim 14, wherein the minimum
2 hamming distance between the encoded code words prevents each of the encoded
3 code words from having fewer than a predetermined number of bits different from
4 any other encoded code words.

1 **16.** The computer program recited in claim 15, wherein the accepting of
2 the data when a match is found in the table containing all the encoded code word,
3 further comprises:

4 receiving a character by the receiving device;

5 decoding the received character to reduce the number of bits contained in the
6 receive character;

7 de-scrambling the character by XORing the character with the value received
8 from the scrambler generator;

9 determining if a first character received is a valid opcode by comparing the
10 first to a table containing opcodes;

11 transmitting a retransmission request when the first character is not a valid
12 opcode and

13 repeating receiving a character by the receiving device, decoding the received
14 character to reduce the number of bits contained in the receive character, de-
15 scrambling the character by XORing the character with the value received from the
16 scrambler generator until no further characters are received when the first character
17 is a valid opcode.

1 **17.** The computer program recited in claim 16, wherein the predetermined
2 selection criteria is that each encoded code word will have any equal number of ones
3 and zeros.

1 **18.** The computer program recited in claim 17, wherein the hamming
2 distance between the plurality of encoded code words from having fewer than a
3 predetermined number of bits different.

1 **19.** The computer program recited in claim 18, wherein the minimum
2 hamming distance is four bits.

1 **20.** A device for transmitting and receiving a packet of information,
2 comprising:

3 a transmission unit, comprising:

4 a scrambler generator reset to a seed value upon the first byte of data
5 transmitted;

6 an XOR unit connected to the scrambler generator to XOR data
7 received along with the seed value generated by the scrambler unit; and

8 a 8b/10b encoder connected to the XOR unit to convert the data from
9 an eight-bit format;

10 a reception unit, comprising:

11 a scrambler generator which is reset when the data received;

12 a 10b/8b decoder to convert the data from a 10 bits format to an 8 bit
13 format;

14 an XOR unit connected to the 10b/8b decoder to exclusive or the data
15 received with a value from the scrambler generator to create an opcode; and

16 an opcode verification unit to check the validity of the opcode.

1 **21.** The device recited in claim 20, wherein the first byte of data is an
2 operation code of a plurality of operation codes which are encoded to have equal
3 number of bits set to zero and one and to have a maximum hamming distance
4 between the plurality of operation codes, wherein the minimum hamming distance
5 is no two operation codes have fewer than four bits different.